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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/767,756

01/28/2004

Masanobu Sato

P/2699-32

5571

2352 7590 03/19/2008  
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EXAMINER

BLAN, NICOLE R

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

03/19/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/767,756	<b>Applicant(s)</b> SATO ET AL.	
	<b>Examiner</b> NICOLE BLAN	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,18 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-4, 18, and 20-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. The amendments to claims 1 and 18, the addition of claims 21-24, and the cancellation of claims 2, 14-17, and 19 filed on February 28, 2008 have been acknowledged.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**5. Claims 1, 3-4, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kanno et al. (U.S. Patent 5,918,817).**

Claims 1 and 3-4: Kanno teaches a method of treating a semiconductor substrate [col. 1, lines 8-15]. The method of Kanno comprises generating droplets of a treatment liquid by mixing the treatment liquid with a gas [col. 7, lines 3-14], wherein the particle size of the droplet is about 10  $\mu\text{m}$  [reads on “volume median diameter” and on the range claimed in claim 1; col. 14, lines 22-30]; impinging the droplets on a surface of the substrate [col. 1, lines 8-15; col. 4, lines 20-24; col. 7, lines 3-14]. With regard to claims 3 and 4, since Kanno teaches supplying the treatment liquid at a flow rate of about 100 ml/min [col. 9, lines 37-45; col. 10, lines 45-48], which is identical to the flow rate of claim 4, since Kanno teaches the droplet size of about 10  $\mu\text{m}$  [col. 14, lines 22-30], which is within the instantly claimed ranges, the flow rate of the gas for generating such droplets would inherently be within the range as per claim 3.

Furthermore, even if the reference to Kanno is removed from the scope of 35 U.S.C. 102 (b) rejection with regard to claims 3 and 4, one skilled in the art still obviously will come to the gas supply pressure, which corresponds to the gas amount and, therefore, gas flow rate as claimed in order to produce liquid droplets of about 10  $\mu\text{m}$  while supplying a treatment liquid into the cleaning jet nozzle of Kanno at the rate of about 100ml/min.

Claim 18: Kanno teaches a substrate treatment method as set forth in claim 1, wherein the droplet generating step includes the step of generating the droplets of the treatment liquid by using a bifluid nozzle [(30), Fig. 12, col. 13, line 40] having: a casing [(31 and 32), Fig. 12, col. 13, lines 43-47]; a liquid outlet port for discharging a treatment liquid [(3), Fig. 12, col. 13, line

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53]; and a gas outlet port for discharging a gas [space between (32) and (33) as well as space between (34) and above (3), Fig. 12, col. 13, lines 43-53]; whereto the bifluid nozzle is adapted to introduce the treatment liquid and the gas into the casing [col. 13, lines 63-67], generate the droplets of the treatment liquid by spraying the gas discharged from the gas outlet port over the treatment liquid discharged from the liquid outlet port outside the casing, and the spout the droplets on the surface of the substrate [Fig. 12, col. 13, lines 40-67; col. 14, lines 1-33].

**6. Claims 1, 3-4, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izumi et al. (U.S. PGPub 2003/0170988), and as evidenced by Kanno.**

Claims 1 and 3-4: Izumi teaches a substrate treatment method comprising generating droplets of a treatment liquid by mixing the treatment liquid with compressed air in a bi-fluid nozzle; impinging the droplets on a surface of the substrate, wherein the flow rate of the compressed air introduced into the bi-fluid nozzle is 50 to 100 ml/min [page 9, paragraph 131, lines 4-6], and the flow rate of the treatment liquid introduced into the bi-fluid nozzle is 100 to 150 ml/min [page 9, paragraph 131, lines 6-8].

Izumi teaches that the droplets of the treatment liquid provided under such conditions each had a diameter of about 5 to about 20  $\mu\text{m}$  [page 9, paragraph 131]; however, Izumi does not explicitly teach the claimed diameter size. However, Kanno teaches that a median diameter size for droplets of about 10  $\mu\text{m}$  [col. 14, lines 22-30] is conventionally known in the art. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the median diameter, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 18: Izumi and Kanno teach the limitations of claim 1 above. Izumi also teaches that the droplet generating step includes the step of generating the droplets of the treatment liquid by using a bifluid nozzle [(68), Fig. 2, page 2, paragraph 33; page 4, paragraph 60] having: a casing [(34 and 39), Fig. 2, page 4, paragraph 61]; a liquid outlet port for discharging a treatment liquid [(39a), Fig. 2, page 4, paragraph 62]; and a gas outlet port for discharging a gas [(34a), Fig. 2, page 4, paragraph 62]; whereto the bifluid nozzle is adapted to introduce the treatment liquid [(37c), Fig. 2] and the gas into the casing [(37d), Fig. 2, page 4, paragraph 63], generate the droplets of the treatment liquid by spraying the gas discharged from the gas outlet port over the treatment liquid discharged from the liquid outlet port outside the casing, and the spout the droplets on the surface of the substrate [Fig. 2, pages 4-5, paragraphs 61-65].

**7. Claims 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanno, and in view of Izumi.**

Claims 20-23: Kanno teaches a method of treating a semiconductor substrate [col. 1, lines 8-15]. The method of Kanno comprises generating droplets of a treatment liquid [reads on “water” in claim 24; col. 3, lines 26-31; col. 20, lines 3-5 and 45-46] by mixing the treatment liquid with a gas [col. 7, lines 3-14], wherein the particle size of the droplet is about 10  $\mu\text{m}$  [reads on “volume median diameter” and on the range claimed in claims 20 and 21; col. 14, lines 22-30]; impinging the droplets on a surface of the substrate [col. 1, lines 8-15; col. 4, lines 20-24; col. 7, lines 3-14].

With regard to claims 22 and 23, since Kanno teaches supplying the treatment liquid at a flow rate of about 100 ml/min [col. 9, lines 37-45; col. 10, lines 45-48], which is identical to the flow rate of claim 23, since Kanno teaches the droplet size of about 10  $\mu\text{m}$  [col. 14, lines 22-30],

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which is within the instantly claimed ranges, the flow rate of the gas for generating such droplets would inherently be within the range as per claim 22.

Kanno does not explicitly teach the type of gas used in the bi-fluid nozzle. However, Izumi teaches a similar method for treating a substrate using a pressurized gas consisting of Nitrogen [page 2, paragraph 26, lines 3-5]. Thus, it would have been obvious to a person of ordinary skill in the art to use the gas disclosed by Izumi in an attempt to provide an improved method for treating substrates, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because the method of cleaning as claimed has the properties predicted by the prior art, it would have been obvious to use the nitrogen gas disclosed by Izumi in the nozzle of Kanno.

Claim 24: Kanno teaches a substrate treatment method as set forth in claim 20, wherein the droplet generating step includes the step of generating the droplets of the treatment liquid by using a bifluid nozzle [(30), Fig. 12, col. 13, line 40] having: a casing [(31 and 32), Fig. 12, col. 13, lines 43-47]; a liquid outlet port for discharging a treatment liquid [(3), Fig. 12, col. 13, line 53]; and a gas outlet port for discharging a gas [space between (32) and (33) as well as space between (34) and above (3), Fig. 12, col. 13, lines 43-53]; whereto the bifluid nozzle is adapted to introduce the treatment liquid and the gas into the casing [col. 13, lines 63-67], generate the droplets of the treatment liquid by spraying the gas discharged from the gas outlet port over the treatment liquid discharged from the liquid outlet port outside the casing, and the spout the droplets on the surface of the substrate [Fig. 12, col. 13, lines 40-67; col. 14, lines 1-33].

***Response to Arguments***

8. Applicant's arguments filed February 28, 2008 have been fully considered but they are not persuasive.

9. In response to the Applicant's arguments regarding Kanno not suggesting the claimed range of the median diameter, the Examiner respectfully disagrees. Applicant's argument appears to contradict what is taught by the reference. The excerpt cited from Kanno discussed 4 different median diameter ranges that correspond to various embodiments of their invention. The diameters correspond as follows: "about 20  $\mu\text{m}$ " corresponds to the conventional method, "about 10  $\mu\text{m}$ " corresponds to the first embodiment, "about 5  $\mu\text{m}$ " corresponds to the second embodiment, and "about 2  $\mu\text{m}$ " corresponds to the third embodiment. The embodiment which is relied upon for the rejection that provides a median diameter of 10  $\mu\text{m}$  is the first embodiment. It appears the Applicant's misread the document. Therefore, Kanno's first embodiment does in fact teach a method with median diameters falling within the claimed range.

10. Applicant's arguments with respect to the claims rejected over Izumi have been considered but are moot in view of the new ground(s) of rejection. Please see the detailed explanation above. However, the Examiner would like to note that the claimed limitations that recite the median diameter being within the range does not preclude larger or smaller droplets from being present based on the definition of volume median diameter.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. B./  
Examiner, Art Unit 1792

/Alexander Markoff/  
Primary Examiner, Art Unit 1792